

Before the FEDERAL COMMUNICATIONS COMMISSION Washington, D.C. 20554

In the Matter of)	
)	
Replacement of Part 90 by Part 88 to)	
Revise the Private Land Mobile Radio)	
Services and Modify the Policies)	
Governing Them)	
•)	PR Docket No. 92-235
and)	
)	
Examination of Exclusivity and)	
Frequency Assignment Policies of)	
the Private Land Mobile Radio Services)	

REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULE MAKING

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By the Commission:

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I. INTRODUCTION

1. By this action, we resolve many of the technical issues which have inhibited private land mobile radio (PLMR) users from employing the most spectrally-efficient technologies. Specifically, we adopt extensive rule changes to the PLMR services¹ which will promote highly effective and efficient use of the PLMR spectrum and facilitate the introduction of advanced technologies into the private mobile services. The rules we adopt

This proceeding primarily addresses the PLMR services licensed under subparts B, C, D, and E of Part 90 of the Commission's Rules, 47 C.F.R. Part 90; that is, those licensed in the 150-174, 421-430, 450-470, and 470-512 MHz frequency bands. Since the changes do not affect the private mobile services above 800 MHz, we refer to these frequency bands as "below 800 MHz" or "refarming bands" for convenience. Additionally, the terms "private mobile" and "private wireless" or "PLMR" are interchangeable for the purposes of this proceeding.

today establish a new channelling plan and provide technical flexibility which will enable private wireless users to make equipment investment decisions to accommodate their diverse needs. We have also made certain modifications to our regulatory and technical framework for the PLMR services and have incorporated those rule modifications into Part 90 of the Commission's Rules. Consequently, we have decided not to replace Part 90 of the Commission's Rules, 47 C.F.R. Part 90, with Part 88 at this time.

- 2. Our primary goal in this proceeding has been to develop an overall strategy for using the spectrum in the PLMR allocations more efficiently to meet future communications requirements. This is an era of unparalleled advances in mobile radio technology. It is also an era of unparalleled demand for radio spectrum to provide the exciting array of new wireless services. Because of the many special characteristics of the private radio services, such as spectrum sharing and no-cost spectrum use, it has been particularly difficult to encourage spectrum efficiency in these bands. We seek, in this proceeding, to ensure the provision of essential private wireless services, and to provide marketplace incentives to enhance spectrum efficiency so as to satisfy PLMR demand well into the 21st century. Realizing this goal has proven to be complex because this proceeding attempts to introduce new technologies and regulations into heavily-licensed, shared spectrum. Also, many licensees, such as public safety entities, have special communications needs. Further, in many cases, the new assignments in these bands are needed by the same group of users that are being displaced. In this regard, we note that the spectrum in the frequency bands under consideration in this proceeding supports over 12 million transmitters with an aggregate value of \$25 billion dollars.² We believe that the changes we make today represent a significant first step towards establishing a technical and policy framework for the PLMR service that will permit and encourage more efficient use of the spectrum and help chart the course to meet the future demand for private wireless services.
- 3. In sum, the decisions made in this proceeding represent reforms that introduce regulatory flexibility and seek to introduce marketplace forces into the private wireless environment. In reaching the decisions that are set forth in this item, we have been guided by the following objectives:
 - (1) to provide technical flexibility which enhances deployment of new technologies and promotes a competitive and robust marketplace for product development;
 - (2) to provide a regulatory structure which allows private licensees and equipment manufacturers the opportunity to introduce new applications and enhancements to existing services;

² Letter from User Associations to William F. Caton, Federal Communications Commission (p. 5), dated January 13, 1995.

- (3) to create policies which address the diverse communications requirements of the wide array of large and small private wireless users and enable these licensees to make equipment investment decisions which best satisfy their business needs; and
- (4) to create incentives to encourage the efficient and intensive use of the spectrum and to ensure that users recognize the opportunity cost of inefficient spectrum use.
- 4. In the Further Notice of Proposed Rule Making (FNPRM) section of this item we seek to determine how certain market-based incentives such as exclusivity with the right to lease excess capacity, spectrum user fees, and/or competitive bidding can be introduced into these PLMR bands to promote more efficient use of this spectrum. The introduction of these market-based tools will provide users with appropriate incentives to employ the most advanced technology and maximize the efficient use of the spectrum. This proceeding has been a forum to conduct a comprehensive review of the private land mobile radio services. We believe that the further exploration of these initiatives is particularly important during this period of profound change in mobile radio. We acknowledge the longstanding tradition of private mobile radio services to provide for the safety and general welfare of the American populace and promote the economic vitality of this country's commerce and industrial structure. We note, however, that many private communications services can be successfully satisfied by third-party commercial carriers as evidenced by the success of specialized mobile radio (SMR) systems. In soliciting further comments on exclusivity, we explore several policy questions related to commercial-type activities, such as the leasing of excess capacity. In addition, we seek comment on the introduction of user fees, and/or competitive bidding to encourage spectrum efficiency.

II. EXECUTIVE SUMMARY

5. This proceeding commenced in order to explore options to promote the more effective and efficient use of the PLMR spectrum bands. Although, the immediate problem the Commission sought to address was frequency congestion, the Commission's broader objective was to develop a regulatory strategy which promotes more efficient use of the existing spectrum allocations to satisfy future private land mobile telecommunications requirements. Since this proceeding was initiated over four years ago much has changed in our approach to managing spectrum. In the Omnibus Budget Reconciliation Act of 1993 (Budget Act), Congress granted the FCC authority to use auctions to award spectrum licenses when mutually exclusive applications were received for initial licenses of subscriber-based services. Since receiving auction authority less than two years ago, the Commission has completed four auctions assigning 40 Narrowband Personal Communications Service (PCS) licenses, 594 Interactive Video Data Service (IVDS) licenses and 99 Broadband PCS licenses. We have determined that auctions spur the rapid introduction of a wide array of new products and services that will increase competition and bring lower prices for

consumers. As a result of our experience with auctions, we have concluded that using competitive bidding to award licenses, as compared with other licensing mechanisms, speeds the development and deployment of new services and encourages efficient use of the spectrum. In this regard, we note that auctions generally award licenses quickly, to those parties who value them the most highly and who are therefore most likely to introduce service rapidly to the public.³

- 6. Currently, the Commission does not have statutory authority to conduct auctions or impose user fees in the PLMR bands. However, the Administration's FY 1996 budget proposes that the Commission's authority to use competitive bidding be expanded. Expanded auction authority and the imposition of fees to encourage more efficient distribution and use of the spectrum underlies the budgetary assumptions in the FY 1996 Senate Budget Resolution.⁴ User fees or competitive bidding may be appropriate to encourage greater spectrum efficiency and to ensure that the public receives a "fair return" for spectrum.⁵ Therefore, we seek comment in the FNPRM on the use of market-based user fees and competitive bidding as tools to introduce market-based incentives into these private wireless bands. However, because public safety entities are charged with the protection of human life and property, we propose to exempt them from user fees and competitive bidding.
- 7. In order to achieve our objective of increasing the efficiency of the PLMR frequency bands, we adopt changes to our technical rules and seek comment on the introduction of certain market-based incentives as follows:
 - We establish a narrowband⁶ channel plan based on current channel centers.⁷

³ Implementation of Section 309(j) of the Communications Act - Competitive Bidding, PP Docket No. 93-253, Competitive Bidding Second Report and Order, 9 FCC Rcd 2348, 2358 (1994).

⁴ Senate Committee on Budget, Concurrent Resolution on Budget for FY 1996 to accompany S. Con. Res. 13, S. Rep. No. 104-82, 104th Cong., 1st Sess. 199-200 (1995).

⁵ <u>See</u> letter from AT&T to William F. Caton, Federal Communications Commission, dated April 26, 1995 and letter from Linear Modulation Technology Limited to William F. Caton, Federal Communications Commission, dated May 16, 1995.

In this document, narrowband or NB refers to channel spacings of 7.5 kHz in the VHF PLMR band and 6.25 kHz in the UHF PLMR bands, or channel bandwidths of 6.25 kHz or less in all PLMR bands unless specified otherwise. We will refer to NB technology or NB equipment to include all advanced technologies designed to operate with channel bandwidths of 6.25 kHz or less or equipment with 6.25 kHz equivalent efficiency such as TDMA (2 channels in 12.5 kHz or 4 channels in 25 kHz).

Technology that provides either narrowband or the equivalent efficiency will be allowed. We allow the flexibility of aggregating up to the equivalent of 4 NB channels provided that spectrum-efficient technology is employed (e.g. 4-TDMA in 25 kHz). This approach will enable users to employ the most spectrally-efficient technology available, while causing the least disruption to their own and other existing operations. This channeling plan establishes a channelization framework that is flexible, technology-neutral, and can easily be adapted to user fees or competitive bidding, if authority to use these mechanisms is obtained.

- Users will not be required to replace existing systems; rather, we will manage the transition to narrowband equipment by type accepting only increasingly efficient equipment over a ten-year period. Pursuant to this transition plan, after August 1, 1996 only equipment that operates with a 12.5 kHz or less channel bandwidth will be type accepted. However, multi-mode equipment that operates on 25 kHz channels will be allowed if it is also capable of operating on 12.5 kHz and/or narrower channels. Single mode equipment that operates on wider channels (up to 25 kHz), but which meets narrowband efficiency standards will also be allowed. After January 1, 2005, only equipment that operates on narrowband channel bandwidths will be type accepted. Multi-mode equipment that operates on 25 kHz and/or 12.5 kHz channels will be allowed if it is also capable of operating on 6.25 kHz or narrower channels. Similarly, single mode equipment that operates on wider channels (up to 25 kHz), but which meets narrowband efficiency standards will be allowed. This transition plan will provide users with maximum flexibility to continue using their existing equipment or employ the transitional 12.5 kHz equipment until a full line of affordable narrowband equipment is available. It also provides manufacturers with incentives to develop and market narrowband equivalent technology over a relatively short period.
- We also conclude that the PLMR service groups must be consolidated and that competition should be introduced into the coordinator services for each service group. Consolidation of the service groups will provide for more efficient allocation of the increased capacity created by the introduction of more efficient technology. We indicate that two to four broad categories, including one for Public Safety users, appears reasonable. We believe, however, that consolidation can be accomplished most effectively by providing the industry with three months to negotiate and submit a consensus consolidation proposal to the Commission. The consolidation plan should provide for competition among coordinators in each of the consolidated user

⁷ Throughout a transition to narrowband technology, licensees will be permitted to remain on the frequencies on which they are currently licensed.

groups. If no acceptable consensus plan is submitted within the requisite time, the Commission will devise and adopt a service consolidation plan based on the record.

• We also propose various methods to introduce market forces into the PLMR bands. The proposals addressed in the FNPRM are intended to prepare the Commission and the private wireless users for a changing environment in which the economic value of private spectrum is recognized. Because this shared spectrum has historically been available at no charge to licensees, there has been little motivation for them to employ spectrum efficient techniques. To encourage and motivate the efficient use of this valuable public resource, the Commission will remove technical impediments to introducing spectrally-efficient technology and consider introducing market-based incentives such as exclusivity, the right to resell excess capacity, user fees and/or auctions into this spectrum.

III. BACKGROUND & HISTORY OF THIS PROCEEDING

- 8. In July 1991, we released a Notice of Inquiry (Refarming Inquiry)⁸ because we noted that the number of licensed transmitters in these PLMR bands had grown dramatically, and we projected that the number of licensed PLMR transmitters would double between 1990 and 2000, and double again by 2010. In the Refarming Inquiry, we solicited comments on a diverse array of policy and technological proposals designed to improve spectrum efficiency in the PLMR bands below 800 MHz. We noted that at that time there were about 1.2 million stations and 12 million transmitters in those bands. The 12 million transmitters licensed in these bands constitute 66% of all of the nation's 18 million licensed PLMR transmitters. We also noted that in many areas of the country, the demand for PLMR spectrum had been experiencing dramatic growth.
- 9. In November 1992, we released a Notice of Proposed Rule Making (<u>Refarming Notice</u>) that built upon the information acquired during the inquiry stage and proposed extensive revisions in the PLMR bands below 800 MHz.¹¹ In the <u>Refarming Notice</u>, our goals were (1) to increase channel capacity in the PLMR bands below 800 MHz, (2) to

⁸ Notice of Inquiry, (Refarming Inquiry), PR Docket No. 91-170, 6 FCC Rcd 4126 (1991).

See Final Land Mobile Radio Service Summary, March 13, 1994, p. 496.

¹⁰ Notice of Inquiry, at 4127-4129.

Notice of Proposed Rule Making, (Refarming Notice), PR Docket No. 92-235, 7 FCC Rcd 8105 (1992).

promote more efficient use of these channels, and (3) to simplify our rules.¹² We called for an overhaul of our policies governing the assignment principles for the PLMR services in bands below 800 MHz.¹³ In the <u>Refarming Notice</u>, we sought to increase channel capacity and improve quality of service, without imposing unreasonable burdens on present and future licensees.¹⁴ Finally, because the proposed rules were in many ways radically different from our current rules, we proposed to replace Part 90 with Part 88.

- 10. Specifically, in the <u>Refarming Notice</u>, we presented four major proposals designed to increase spectral efficiency, <u>i.e.</u>, number of available channels, in the PLMR bands. First, we proposed spectrum efficiency standards that would quadruple channel capacity over a 10-20 year period by ultimately reducing channel spacing to 6.25 kHz or less, while at the same time providing technical flexibility. Second, we proposed a marketplace mechanism, "Exclusive Use Overlay," by which channels below 800 MHz would still be shared, but further assignments in those channels would be limited.¹⁵ Third, we proposed consolidating the 20 PLMR services¹⁶ into 3 frequency pools. Fourth, we recommended new technical and operational standards, including significantly reducing permissible power levels, permitting centralized trunking, and designating specific channels for new high-technology operations.¹⁷
- 11. In response to the <u>Refarming Notice</u>, we held two public forums¹⁸ and received over 500 comments, 66 reply comments, 796 letters from Members of Congress, and several hundred other letters.¹⁹ While there was disagreement with some of the proposals, based on

¹² Refarming Notice at para. 1.

¹³ The primary bands under consideration are shown in Appendix A, Figure 2.

¹⁴ Refarming Notice at para. 6.

¹⁵ This option includes a form of pseudo-exclusivity in that licensees can limit additional assignments from being made on a channel based on concurrence and loading criteria.

Since the <u>Notice</u> was adopted, an additional radio service, the Emergency Medical Radio Service (EMRS), was added. This raised the number of radio services from 19 to 20.

¹⁷ Refarming Notice at para. 6.

The Private Radio Bureau, in cooperation with the Annenberg Washington Program, Communications Policy Studies, of Northwestern University, sponsored a conference on Refarming on November 14, 1991. Additionally, the Bureau held a Refarming Technology Roundtable on May 16, 1993.

A list of commenters and reply commenters is given in Appendix B. The Notice's comment date was February 26, 1993. The reply comment date was April 14, 1993.

the broad range of comments and the information presented at the forums, the PLMR community generally supports our primary objective of making more efficient use of the spectrum below 800 MHz.²⁰ The Refarming Notice generated a great deal of comment and controversy, however, due to the extensive impact on existing private radio licensees. The user community generally agreed with our goals to reduce spectral occupancy but many opposed plans to implement a maximum 5 kHz or 6.25 kHz channel bandwidth. Many commenters also cautioned about the need to provide sufficient time, to avoid disruption to their operations, to achieve such a large reduction in channel bandwidth.²¹ Further, virtually all commenters opposed the proposed restrictions on antenna height and transmitter power. Finally, there was no consensus relative to consolidation of radio services. On this point, many parties made suggestions and offered variations on our proposals for consolidation, including, but not limited to, the creation of service(s) for right-of-way companies,²² public safety entities,²³ and certain industrial users which would be exempt or partially exempt from the Refarming Notice's exclusivity proposal.²⁴

A. Recent Legislative and Regulatory Developments

12. On August 10, 1993, the Omnibus Budget Reconciliation Act was enacted.²⁵ That legislation established two categories of mobile services: commercial mobile radio service (CMRS) and private mobile radio service (PMRS). CMRS is defined as a mobile service that "is provided for profit and makes interconnected service available (A) to the public, or (B) to such classes of eligible users as to be effectively available to a substantial portion of the public." PMRS is defined as a mobile service that "is not a commercial mobile service or the functional equivalent of a commercial mobile service." In response to the new statute, we instituted a series of rule makings to further define the distinction

LMCC, for example, stated that they are "in agreement with the fundamental intent and direction of improving efficiency...." Comments of LMCC at 3. See also Reply Comments of Motorola at i.

²¹ Current PLMR channel bandwidth (excluding interstitial channels) is 25 kHz.

²² Reply Comments of the American Petroleum Institute at 6-9.

²³ Reply Comments of the Public Safety Communications Council at 3.

Specific comments upon proposals in the <u>Refarming Notice</u> including consolidation of services into three frequency pools, are discussed later in this document.

Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI § 6002(b),
Stat. 312, 392 (1993) (Budget Act).

²⁶ Communications Act, § 332(d), 47 U.S.C. § 332(d).

between commercial and private service providers. In the <u>CMRS Second Report and Order</u>, ²⁷ the Commission outlined a three prong test for CMRS: (1) the service must be one "that is for profit," (2) the system must make "interconnected service" available, and (3) the service must be effectively available to a substantial portion of the public. ²⁸ Pursuant to the directive in the Budget Act, existing private services were reviewed under the new statutory definitions. We specifically noted that public safety and governmental services, as well as businesses and other private entities who operate mobile systems exclusively for internal use, would not be considered "for-profit" services. We also indicated that, where a system is used only to serve a licensee's internal communications requirements rather than being offered with the intent of receiving compensation, such licensee is not providing service "for-profit" within the meaning of the statute. ²⁹ Upon review, the Commission concluded, except for private carriers licensed in the Business Radio Service, that all private mobile licensees within the refarming bands are classified as PMRS since they are internal use systems and not available to a substantial portion of the public.

13. In addition to enacting new definitions for mobile services, the Communications Act in Section 309(i) provides the Commission with the authority to use competitive bidding procedures to choose among mutually exclusive applications for initial licenses.³⁰ At the same time, Section 309(j)(2)(A) requires that in order for competitive bidding to apply, the "principle use" of the spectrum must involve, or be reasonably likely to involve, the transmission or reception of communications signals to subscribers for compensation.³¹ In the Competitive Bidding Second Report and Order, the Commission reviewed the applicability of competitive bidding for private services. We indicated that "private services" in the Section 309(j) auction context and "private mobile services" as defined in Section 332(d)(3) of the Communications Act are different from each other. In determining eligibility for competitive bidding, the term "private services" refers to services that do not involve the payment of compensation to the licensee by subscribers, i.e., that are for internal use; whereas, Section 332(d) distinguishes private versus commercial mobile services on the basis of several criteria, including whether interconnected mobile service is provided for a profit to the public or a substantial portion of the public. In the Competitive Bidding Second Report and Order, the Commission concluded that the private mobile services were not subject to competitive bidding because they failed the test for competitive bidding: the

²⁷ Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, <u>CMRS Second Report and Order</u>, Gen. Docket No. 93-252, 9 FCC Rcd 1411 (1994).

²⁸ CMRS Second Report and Order at para. 11.

²⁹ CMRS Second Report and Order at para. 44.

³⁰ Competitive Bidding Second Report and Order, 9 FCC Rcd at 2350.

³¹ See also Competitive Bidding Second Report and Order at para. 30-32.

"principle use" of this PLMR spectrum was not subscriber based and, because the spectrum was shared, it did not involve mutually exclusive applications.³² We note, however, that the Refarming Notice sought to introduce exclusivity into certain PLMR bands.

14. In the next section entitled "Report and Order," we address the PLMR rules that we are adopting regarding channelization, transition, consolidation of radio services, and technical parameters. In the section, "Further Notice of Proposed Rule Making," we discuss exclusivity and seek further comment on that topic and related matters, e.g., leasing of excess capacity.³³

IV. REPORT AND ORDER

A. Introduction

15. By this action, we adopt extensive changes to the PLMR service rules.³⁴ These changes will promote the best use of the PLMR spectrum and stimulate introduction of advanced technologies into private mobile services. The rules adopted today: (1) establish a new channelling plan; (2) provide a flexible time frame in which private wireless users can make individual business decisions to accommodate their varied needs; (3) improve our regulatory and technical framework for the PLMR services; and, (4) mandate consolidation and suggest an initial framework for the consolidation of the 20 private radio services. We have decided to focus on those technical issues which most directly promote improvements in spectrum efficiency. We are not pursuing the more fundamental changes that would have resulted from the replacement of Part 90 with Part 88 at this time. Even the more limited changes adopted herein are considerable. Other proposed changes to Part 90 would have amended CMRS provisions. Rather than taking this additional action, we believe that the public would be best served by focusing on changes only to PLMR at this juncture and reassessing certain parts of our original proposals in future proceedings. Specifically, we are adopting rules to promote conversion to new efficient technologies. We are:

³² Competitive Bidding Second Report and Order at para. 13.

As discussed earlier, we have decided that this Refarming proceeding would concentrate on major PLMR issues in the 150-174, 421-430, 450-470, and 470-512 MHz bands only. Any proposal that is not included in our discussion today, but was included in the original <u>Refarming Notice</u> is considered closed and is not to be considered part of the Further Notice of Proposed Rule Making adopted today.

³⁴ See supra note 1.

- (1) Adopting a channel plan which permits the use of narrowband (NB) technologies,³⁵ but allowing wideband equipment that employs technology that is at least as spectrally efficient as narrowband equipment.
- (2) Encouraging transition to spectrum-efficient technology by type accepting new efficient equipment and by not type accepting 25 kHz bandwidth equipment in one year unless its wideband operation meets a minimum efficiency standard or it is multi-mode.
- (3) Specifying new technical standards (e.g., transmitter power, emission limitations, and frequency stability) that accommodate a wide range of technologies and products.
- (4) Achieving consolidation of radio services by allowing three months for the industry to further consider and submit their views on a consolidation plan to the Commission.

B. Channelization

16. Proposal. The <u>Refarming Notice</u> set forth a complex set of changes by which the spectrum would be sub-divided from channels 15-30 kHz wide into narrowband (NB) channels.³⁶ We proposed that applicants be required to operate with NB technologies or,

³⁶ Currently, PLMR channels are generally spaced as follows:

Frequency Band (MHz)	Cha	Channel Spacing (kHz)	
25-50	20		
72-76	20	(R/C Service operates on 10 kHz splits)	
150-174	15	(5 kHz permitted on frequency offsets)	
		(30 kHz for some business frequencies)	
220-222	5	- · · · · · · · · · · · · · · · · · · ·	
421-430	25		
450-470	25	(low power permitted on 12.5 kHz offsets)	
470-512	25		
806-821/851-866	25		
821-824/866-869	12.5		
896-901/935-940	12.5		

Channels will be interleaved between current channels allowing existing assignments to remain on-channel. Thus, the channels in the VHF band at 150-174 MHz are spaced every 7.5 kHz, and the channels in the UHF bands at 421-430, 450-470, and 470-512 MHz are spaced every 6.25 kHz. However, channel bandwidths in all bands will be 6.25 kHz.

alternatively, be allowed to group NB channels together if their new system met certain minimum efficiency standards.³⁷ Specifically, at VHF, we proposed 5 kHz channel spacings for low power mobile frequencies in the 72-76 MHz band and for all frequencies in the 150-174 MHz band; at UHF we proposed 6.25 kHz channel spacings for the 421-430, 450-470, and 470-512 MHz bands. This proposal had two key components. First, existing systems would reduce their occupied bandwidths from 25-30 kHz to 10-12 kHz.³⁸ This would allow the spectrum to be "cultivated" by new, more efficient technologies. Second, licensees would be required to replace their systems with new NB equipment and shift their frequencies to align with the new channeling plan.

- 17. Comments. Although the majority of the comments agreed that efficiency should be increased in the bands below 800 MHz, most disagreed with our proposal regarding channelization. Generally, commenters opposed the proposals to shift operating frequencies and to reduce the frequency deviation of current radios. Commenters generally opposed our proposed frequency spacings for all bands, but were not in agreement on what the spacing should be.
- 18. Commenters opposing the requirement to shift³⁹ their operating frequency claimed it would seriously hamper the migration process by inhibiting forward and backward compatibility⁴⁰ between systems. APCO states that "[a]n offset channel plan ... would essentially make all existing equipment obsolete, due to incompatible synthesizers."⁴¹ Safety-related services also argue that shifting frequencies could result in serious interference to critical functions due to confusion regarding operating frequencies.
- 19. Many opposing the proposal indicate that existing equipment cannot be easily modified to operate with bandwidths of 10-12 kHz. Commenters state that a reduction in the frequency deviation of existing equipment without a corresponding change in the receiver will be ineffective. TIA asserts that "... reduced deviation in the transmitter requires

As proposed, narrowband (NB) refers to channel spacings of 5 kHz in the VHF band and 6.25 kHz in the UHF bands and occupied bandwidths of 4 and 5 kHz, respectively; wider channels can be used provided that such use is as efficient as narrowband technology.

³⁸ We proposed that the frequency deviation of existing equipment be reduced by January 1, 1996.

Many commenters refer to the proposal to shift their operating frequency as an offset frequency plan.

Forward and backward compatibility enables new equipment to communicate with existing as well as future equipment. For example, commenters claim new 12.5 kHz equipment could be compatible with existing 25 kHz and future 6.25 or 5 kHz equipment.

⁴¹ Comments of APCO at 8.

additional audio gain in the receiver ..." TIA also says that system range will be reduced and "[m]erely reducing deviation does not improve transmitter stability to that of a true 12.5 kHz unit." In its comments Ericsson states, "[t]he reduction in transmitter deviation of standard 25 kHz or 30 kHz transmitters leaves the receivers in such equipment exposed to interference..." and, "[t]he only way to avoid the interference is to replace components on the receiver at the same time the transmitter deviation is reduced." Finally, Motorola states that "... without a corresponding reduction in receiver selectivity, new operations introduced on the newly created adjacent channels will cause an almost twenty fold increase in adjacent channel interference to current users, even if 6.25 kHz or 5 kHz equipment is deployed." Motorola also states that, "[a]ny significant improvements in spectral efficiency must come through the deployment of new equipment."

- 20. Thus, commenters indicate that to meet the proposed requirements, systems may have to be changed-out twice in 10-13 years; first to comply with the reduced frequency deviation requirement, and second, to comply with the narrowband channel spacing. Otherwise, they would have to change-out their systems once and prematurely implement NB technology. Many public safety and safety-related groups, such as railroads, oppose implementation of NB systems until (1) a full line of equipment is available including portables, (2) the technology is proven under field conditions, particularly in urban environments, and (3) a migration plan can be developed to ensure a smooth transition from current FM analog-based platforms to newer, digital-based technologies. Consequently, many users request that existing licensees be permitted to stay on their current frequency assignment ("on-channel") and convert to true 12.5 kHz technologies before proceeding to NB systems.
- 21. Many commenters presented plans recommending channel spacings of 2.5, 5, 6.25, 7.5, or 12.5 kHz. LMCC submitted a UHF channelization plan of 12.5 kHz channel spacing and two options at VHF: option A suggests implementing 12.5 kHz equipment by 2004 and option B suggests implementing 6.25 kHz equipment by this same date. LMCC further suggests that 6.25 kHz channel spacing at UHF be the subject of a future rule making. Motorola, in favor of 12.5 kHz channelization, points out that "[t]he transition to true 12.5 kHz will provide significant improvements in spectrum efficiency, improve the quality of the service and expand the applications using private land mobile radio... 12.5 kHz channelization offers similar prospects for efficiency as VNB [6.25 kHz] while remaining

⁴² Comments of TIA at 7.

⁴³ Comments of Ericsson at 6 and 7.

⁴⁴ Comments of Motorola at 20.

⁴⁵ Comments of Motorola at 22.

⁴⁶ Comments of LMCC at 8.

technology-neutral and allowing the development of services and applications that would be precluded under strict VNB channelization."47 Conversely, several manufacturers and various users support adoption of a narrowband, 6.25 kHz or less, channelization plan immediately. 48 Ericsson states that "... moving directly from 25/30 kHz channels to 6.25 kHz or 6.25 kHz equivalent efficiency channels in all of the bands under consideration would allow spectrum to be used more efficiently."⁴⁹ Ericsson also supports, "technical flexibility which allows the PLMR user to determine the particular technology which best suits its needs and which does not discriminate against any type of digital system;" and "a channel allocation plan which ... enable[s] the use of narrowband or wideband channels to accommodate a variety of technologies which will offer the best combination of voice and/or data services as determined by the user."50 Also in favor of flexibility, Securicor advocates splitting the PLMR spectrum into 2.5 kHz blocks and allowing users to aggregate as many blocks as they need.⁵¹ Securicor states that "[t]his '2.5 kHz or more' band plan would enable a licensee to tailor its bandwidth more precisely to its real needs ..."52 Cycomm. GEC-Marconi, NTT, PowerSpectrum, SEA, Uniden, and UPS indicate a desire for us to adopt a 5 kHz standard for all bands. In favor of narrowband channels, AT&T states that "... narrowband channels will foster the emergence of new technologies, new service providers using those technologies, and many equipment manufacturers competing to serve this marketplace. That competition will lead to development of more spectrally efficient technologies and lower costs for consumers."53 NABER presents a somewhat different plan that they called "Bandwidth on Demand," whereby users can combine contiguous 6.25 kHz channels if they can demonstrate that they meet the efficiency standard. 54, 55 AAR presents a

⁴⁷ Reply Comments of Motorola, Inc. at 9-10.

⁴⁸ AMRA and ATA/FIT/ITLA/MRFAC supported LMCC's Option B.

⁴⁹ Ex parte filing of Ericsson of February 6, 1995.

⁵⁰ Comments of Ericsson at 3.

⁵¹ Ex Parte filing of Securicor of April 20, 1995.

⁵² Letter from Securicor to William F. Caton, Federal Communications Commission, dated June 7, 1995.

⁵³ Letter from AT&T to William F. Caton, Federal Communications Commission, dated April 26, 1995.

⁵⁴ Comments of NABER at 11.

This plan differs from LMCC's Option A because of the emphasis on using 6.25 kHz channel building blocks to allow licensees with differing needs to justify sufficient bandwidth for their needs.

proposal for the 150-174 MHz band based on 12.5 kHz channel bandwidths spaced every 7.5 kHz apart. Moreover, a "User Coalition Plan" representing approximately 95% of PLMR licensees, 56 was filed on January 13, 1995. The Plan suggests a channel bandwidth of 6.25 kHz in all bands with channel spacings of 7.5 kHz at VHF and 6.25 kHz at UHF provided that an optional step based on 12.5 kHz equipment and a two cycle transition period is allowed. 57 Finally, TIA disagreed with our proposal stipulating different channel bandwidths in each band. They support a common channeling plan for both the VHF and UHF bands and state that, "[d]esigning and producing reliable cost-effective land mobile equipment is a complex task requiring significant investment and time. Employing different bandwidths in the 150 and 450 MHz band would require even more resources." 58

22. Of particular concern to many parties, especially public safety, is flexibility to implement APCO-25 standard equipment.⁵⁹ In its comments, APCO indicates that a 12.5 kHz channelization would allow public safety users to obtain the improvements envisioned by the Project 25 digital standard. Also, allowing use of 12.5 kHz equipment would enhance their ability to interoperate with federal government entities, such as the Federal Bureau of Investigation, the Secret Service, the Department of Defense, and the U.S. Forestry Service.⁶⁰ Further, in its comments, APCO states that there is a need for short-term

⁵⁶ See Letter from User Associations to William F. Caton dated January 13, 1995 at 3.

The "User Coalition" plan was submitted by 14 user associations superseding their previously filed objections: American Association of State Highway and Transportation Officials, American Automobile Association, American Petroleum Institute, American Trucking Associations, Inc. Association of American Railroads, Association of Public Safety Communications Officials International, Inc., Forest Industries Telecommunications, Industrial Telecommunications Association, Inc., International Taxicab and Livery Association, Manufacturers Radio Frequency Advisory Committee, Inc., National Association, Telephone Maintenance Frequency Advisory Committee, UTC - The Telecommunications Association.

⁵⁸ Comments of TIA at 16.

The APCO Project 25 standard is a joint federal, state, and local government initiative to develop a suite of technical standards for digital land mobile radio. Phase-one, scheduled to be completed in August 1995, is based on 12.5 kHz frequency division multiple access (FDMA) technology. It is widely supported even outside of the public safety community as a means of providing interoperability between radios built by different manufacturers.

⁶⁰ In an effort to improve spectrum efficiency, the National Telecommunications and Information Administration (NTIA) adopted a conversion timetable for federal agencies to migrate to 12.5 kHz equipment in similar VHF and UHF bands by 2005 or 2008. See NTIA

spectrum relief in especially congested areas and supports 12.5 kHz channels for both VHF and UHF frequencies.⁶¹

- 23. In its comments, the Academy of Model Aeronautics (Academy) claims, "... that the Commission's proposals for the 72-76 MHz band will have a disastrous effect on an industry with annual sales in excess of \$1 billion..." The Academy further states that, "[t]he proposed rules create the possibility that 1-watt land mobile transmitters may be employed in proximity to the R/C modeling activity at random and without warning." The Academy said that because these models, which weigh between 5 and 12 pounds and fly at speeds up to 90 MPH, are frequently flown at events where spectators are present "... it is absolutely critical that the operator of the aircraft be able to control its flight at all times." This view was supported by hundreds of informal letters from individuals, model enthusiasts, and Congressional inquires.
- 24. Decision. Based on the extensive record on this issue, we have decided to modify our proposed channel spacing plan. We will adopt a channelization plan based on narrowband (NB) channel spacings. Regarding the 72-76 MHz band, we will maintain the existing spacings. Most of the record focuses on making improvements in the four PLMR "main-haul" frequency bands: 150-174, 421-430, 450-470, and 470-512 MHz. We will list channels every 7.5 kHz in the 150-174 MHz VHF band and every 6.25 kHz in the 421-430, 450-470, and 470-512 MHz UHF bands, but allow a flexible approach whereby users can choose equipment which best fits their needs by aggregating up to the equivalent of four narrowband channels. Although channels are listed at narrowband spacings, this approach provides users with the option of utilizing equipment designed to operate with either 5, 6.25, 12.5, or 25 kHz channel bandwidths. Our reasons for reaching these decisions are set forth below.
 - 25. In choosing narrowband as the basis of our channelization plan, we considered

Manual of Regulations and Procedures for Federal Radio Frequency Management at § 4.3.7.

- 61 Comments of APCO at 21.
- 62 Comments of The Academy of Model Aeronautics at 1.
- ⁶³ Comments of The Academy of Model Aeronautics at 11.
- 64 Comments of The Academy of Model Aeronautics at 13.
- 65 In light of our "on-channel" channelization plan, licensees who desire to aggregate channels for use with 25 kHz equipment would actually need portions of five narrowband channels the channel corresponding to their center frequency, both first adjacent channels, and one-half of each second adjacent channel. Likewise, 12.5 kHz operation would require the use of portions of three narrowband channels.

the benefits and drawbacks of many different channelization schemes. We find that channelizing at 2.5 kHz would provide the maximum number of channels, but in consideration of current technology and anticipated future trends, we see no substantial benefit to such a channelization scheme. Further, a 2.5 kHz channelization would create a burden on users, all of whom would have to aggregate multiple channels, and unduly complicate the frequency coordination process. Channelizing at 5 kHz would provide a significant increase in the number of available channels and recognize the latest advancements in land mobile technology. However, it would exclude traditional FM technologies and would be substantially narrower than channels employed by most mobile operations. 66 Also, manufacturers of NB equipment acknowledge that it will be about three to five years before NB equipment with a full complement of features can be perfected in the refarming bands and made readily available to users. The channelization plan based on the 5 kHz and 6.25 kHz spacing proposed was supported by only a few commenters, essentially the 5 kHz equipment manufacturers, and was widely opposed by public safety entities, Motorola, TIA, and the majority of existing private radio users. Regarding 12.5 kHz channelization, we find would be more efficient for digital data transmissions, but would not offer significant improvement in spectrum efficiency for voice communications. A 12.5 kHz channelization was supported by the majority of the commenters, ⁶⁷ but it does not meet the Commission's goals of "substantially" increasing channel capacity.⁶⁸ Nor does 12.5 kHz channelization significantly increase the number of available PLMR channels necessary to meet the long range communication needs of this large user community. A 12.5 kHz bandwidth, however, has the following benefits: (1) it provides compatibility with the 12.5 kHz APCO-25 standard equipment being developed by manufacturers in conjunction with the public safety community; (2) it promotes interoperability with 12.5 kHz equipment used by federal government users (such as the Federal Bureau of Investigation, the Department of Defense, and the U.S. Forestry Service); and (3) 12.5 kHz equipment is currently available and can be employed immediately to alleviate severe congestion situations. We also considered a 7.5 and 6.25 kHz "narrowband" channeling plan. This scheme substantially increases the number of available communications channels, while still providing data capabilities adequate for the majority of users. This scheme would also accommodate 5 kHz operations, but would exclude most 12.5 kHz equipment and wideband (25-30 kHz) systems. Finally, we considered leaving PLMR channels at their current

⁶⁶ A 5 kHz channel bandwidth is substantially smaller than the 12.5 or 25 kHz bandwidths currently specified for SMRs, 40 kHz for cellular, 12.5 or 50 kHz for "narrowband" PCS, 25 kHz for maritime mobile, and 25 kHz for aeronautical mobile services.

⁶⁷ For example see Comments of NABER at 11, Comments of AAR at 24, or Joint Comments of ITA, Council of Independent Communication Suppliers, and Telephone Maintenance Frequency Advisory Committee at 14.

⁶⁸ By "substantially," we refer to our goal of a fourfold increase in the actual number of channels available.

spacing, i.e., generally 15 kHz at VHF and 25 kHz at UHF. This plan would have the advantage of using current equipment, but similar to channelizing on 12.5 kHz, there would be no gain in the number of communication channels available to users. Thus, we find that leaving the existing channel spacings garners few benefits to the user community.

- 26. Upon consideration of the factors summarized above, we conclude that the best approach is to establish a narrowband channel plan that also allows users the flexibility to aggregate channels to allow them to employ wider band equipment when it best suits their communications requirements. Generally, we will list assignable channels every 7.5 kHz in the VHF band and every 6.25 kHz in the UHF bands based on current channel centers. Channelizing on current channel centers ("on-channel") will allow users to remain on their current licensed frequency throughout a transition to narrowband. Remaining on-channel was seen as critical to existing licensees. As emphasized by existing users, on-channel transition will minimize confusion and provide a simpler migration path. Adopting a 7.5/6.25 kHz narrowband channelization plan rather than the 5/6.25 kHz plan proposed will accommodate, not only 5 kHz, but also 6.25 kHz equipment without any restrictions. Finally, for example, in order to accommodate the wide variety of licensees and their varied uses of PLMR, we will allow the use of wideband equivalent technologies, e.g. TDMA, across an aggregation of narrowband channels.
- 27. Since we are allowing the use of wideband equipment, we are also taking steps to reduce instances of detrimental adjacent channel interference and generally make a transition to narrowband technology easier on PLMR users. To this end, we will place some restrictions on the maximum bandwidth that can be used on certain channels in the refarming bands. In the 150-174 MHz band, licensees may use equipment designed to operate with a channel bandwidth of 25 kHz or less on any channel available prior to the effective date of the rules adopted in this proceeding. Only equipment designed to operate with a channel bandwidth of 12.5 kHz or less may be used on any of the channels 7.5 kHz removed from any existing channel.⁶⁹ In the 421-512 MHz band, licensees may use equipment designed to operate with a channel bandwidth of 25 kHz on channels available prior to the effective date of the rules adopted in this proceeding. Only equipment designed to operate with a channel bandwidth of 12.5 kHz or less may be used on any of the channels 12.5 kHz removed⁷⁰ from any existing channel and only equipment designed to operate with a channel bandwidth of 6.25 kHz or less may be used on any of the channels 6.25 kHz removed from any existing channel. Additionally, the particular operating environment of each licensee may dictate that separation requirements be imposed by the frequency coordinators. See infra. para. 76 on

⁶⁹ Existing channel refers to any channel available prior to the effective date of the rules adopted in this proceeding.

⁷⁰ Users currently licensed for 25 kHz operation on any of the low power offset channels will continue to be licensed for such operation until they decide to transition to narrowband equipment.

the use of separation requirements for wideband (25 kHz or 12.5 kHz) equipment. Also, the use of wideband equipment will be subject to certain efficiency standards.

- 28. Finally, regarding 12.5 kHz equipment which does not meet our narrowband efficiency standard, we will allow licensees to use true 12.5 kHz equipment during a transition to narrowband technology. This is supported by a majority of users who want to implement equipment designed to meet the 12.5 kHz APCO-25 technical standards. Therefore existing users, who desire to transition to NB, will have the option of transitioning in one step directly or more conservatively via two steps: first to 12.5 kHz then to NB technology. It also will allow users in extremely congested markets to double their capacity almost immediately by employing readily available 12.5 kHz equipment. This approach provides licensees additional flexibility during the transition to select technology best suited to their needs and minimize the impact to their operations. This is consistent with the majority of the commenters. In particular, public safety argued that permitting an intermediate 12.5 kHz step is essential to providing a smooth migration path for existing operations.
- 29. In summary, our approach does not favor any particular type of land mobile technology, but adopts rules that permit the use of new spectrum efficient technologies. This provides technical flexibility by removing current barriers to allow entry of new technology into the private land mobile marketplace. It permits the use of narrowband channels for voice communications and slow-speed data transmissions while also allowing users with requirements for wideband technologies, such as high-speed digital and data transmissions, to employ them. This decision recognizes the operational requirements of a large, diverse community of users and provides a plan that enables the PLMR community to substantially increase the spectrum efficiency of these bands. This approach is consistent with the User Coalition Plan and includes the following benefits: better data transfer capabilities and lower equipment costs than our proposed plan, and technical neutrality -- allowing for 5, 6.25, 12.5 or 25 kHz equipment. This channelization plan provides regulatory flexibility to both users and manufacturers. By adopting a NB channelization plan, we set the direction for the industry to meet our long term goal of increasing the efficiency of the PLMR frequency bands. Moreover, this plan is technology neutral -- it allows all manufacturers and modulation techniques to compete in an open marketplace. It satisfies concerns expressed by many parties, particularly the public safety community and users, such as railroads, who provide critical functions, that the plan include options permitting the selection of proven technology, including portable and feature-rich products. Further, these parties argue that reliable radio service must be maintained during the transition to NB. This plan allows users to review all technology options, solicit competitive bids if appropriate, and choose whichever system is best suited to their communications needs. Moreover, it allows market forces to govern technology and equipment selection based on price and actual performance

A few channels, designated for use as low power and itinerant stations in the Business Radio Service, will remain 12.5 kHz channels. See paragraph 89.

of the differing technologies.

C. Time Frame For Transition To Narrowband

- 30. Proposal. An essential element of the channelization plan is the transition period in which it must be implemented. The <u>Refarming Notice</u> proposed that all systems, including rural areas, would have to convert to narrowband technology over a 10-20 year period depending upon market size. Specifically, we proposed that existing systems in the top 15 markets convert to narrowband technologies by 2004 (approximately ten years). We proposed a graduated schedule from 2005 to 2012 for markets 16-100 to convert to narrowband. Markets 101 and above would be required to convert to narrowband technologies by the year 2014.
- 31. Comments. There are several common themes throughout most of the comments we received on this issue. In general, most commenters emphasize that the transition period should allow for sufficient planning for licensees to amortize existing equipment. Commenters also emphasize the necessity for users to maintain the reliability of their communication systems during any transition period. Finally, as incorporated in the User Coalition plan, others urged that the type acceptance process be used as the catalyst for migration to new, more efficient technologies
- 32. TIA and APCO among others argue for planning cycles long enough for full amortization of equipment. TIA asserts that public safety and public service users typically amortize their investments over ten years or more and expect their systems to have a twenty year life cycle. Turther, APCO comments that "public safety users ... typically operate on extremely limited budgets and are forced to maximize the useful life of their radio equipment. Premature equipment change-outs would cost state and local governments billions of dollars, the burden of which would rest on taxpayers." Finally, the joint comments of ITA, CICS, and TELFAC, "urge the Commission to adequately provide for the graceful transition and amortization of imbedded systems as well as a sufficient planning cycle to implement new technologies." And, "... given both the size of the investment of radio systems and the vital role which the communications systems serve, it is not feasible for licensees to change-out their entire system at one time." Emphasizing this point, many

⁷² Comments of TIA at 5-6.

⁷³ Comments of APCO at 12.

⁷⁴ Joint Comments of ITA, CICS, and TELFAC at 11.

public safety entities and small businesses⁷⁵ note that they operate under unique budgetary constraints which limit them to gradual equipment upgrades, rather than one-time system replacements.⁷⁶

- 33. Additionally, any interruption to service may have a disastrous effect on safety-related operations. The User Coalition plan asserts that, "... most private land mobile users place an extremely high priority on maintaining communications capability ..." This plan suggests two change-out periods of 10 years each to permit a graceful migration from one technology to another. Further, Motorola points out that for PLMR users the most important aspect of a radio system is that it provide reliable, efficient, timely, and cost-effective communications, and "... [t]herefore, premature system change-outs based solely on regulatory mandates are viewed as a waste of resources." APCO states that our proposal "... must be accomplished in a manner that does not impair the degree or quality of communications ..."
- 34. Finally, many commenters, including the User Coalition, suggest that the type acceptance process should provide the catalyst for the transition from one technology to another. The User Coalition plan recommends that after January 1, 2011, all newly type-accepted equipment would have to be capable of operating on 6.25 kHz or narrower channels. After January 1, 2021, available equipment would be further limited by banning the sale of equipment not capable of operating on 6.25 kHz or narrower channels. Other dates associated with this plan were crafted with two different user environments in mind: urban and rural. After January 1, 1997, the licensing of both new urban and rural systems would be restricted to operating on channels of 12.5 kHz or less or be relegated to secondary status. Further, all urban systems would have to operate on channels of 12.5 kHz or less after January 1, 2007. After January 1, 2011, new systems, both urban and rural, would only be licensed only if they operated on channels of 6.25 kHz or less. And finally, all systems would have to operate on channels of 6.25 kHz or less after January 1, 2021 to

According the U.S. Department of Commerce, 70% of all businesses in America are small businesses. According to NABER and Commission data bases, there are 300,000 licensees in the Business Radio Service. Therefore, approximately 210,000 small businesses could be affected by this proceeding.

⁷⁶ Comments of APCO at 12 and Comments of NABER at 8.

⁷⁷ Letter from User Associations to William F. Caton, Federal Communications Commission, dated January 13, 1995.

⁷⁸ Comments of Motorola at 10.

⁷⁹ Comments of APCO at 11.

retain primary status. 80 As stated previously, this plan has the support of approximately 95% of the user community. Also in support of using the type acceptance process to stimulate the transition to narrowband technologies, Motorola states that the Commission should, "[r]equire through the type-acceptance process that manufacturers begin populating the market with true 12.5 kHz capable equipment, ensuring a smooth migration for users." 81 To this end, Motorola recommends that after January 1, 1996, the Commission should no longer type accept equipment that cannot be readily converted to 12.5 kHz operation. 82 APCO comments that after two years of the effective date of the Report and Order, equipment should not be manufactured or type accepted unless it meets stated requirements. 83 NABER proposes a two step plan in which Step One involves the discontinuation of type acceptance for new 25 kHz or 30 kHz analog equipment as soon as practical. 84

- 35. Decision. Determining an appropriate transition period for rechannelization requires balancing the economic and operational impacts of existing users. Many comments note that the transition from the current 25-30 kHz equipment to narrowband technologies involves a substantial replacement of system infrastructure. Existing licensees emphasize that they have over \$25 billion dollars invested in imbedded equipment and much of that equipment is not compatible with narrowband technologies. Although users state that many systems last between 15-20 years, there was general agreement that 10 years (at 10 percent change-out per year) was a reasonable transition cycle. Following this reasoning, the User Coalition Plan, as described above, contemplates two replacement cycles and requests a 26 year transition period.⁸⁵
- 36. We have decided to manage the transition to more spectrum efficient use of the PLMR frequency bands by the type acceptance process as suggested by the User Coalition Plan, Motorola, and others. We are requiring that future equipment meet increasingly efficient standards over a ten year period. With the introduction of market-based incentives as discussed in the FNPRM, this plan will permit and promote a natural migration to new technologies.

⁸⁰ Letter from User Associations to William F. Caton, Federal Communications Commission, dated January 13, 1995.

⁸¹ Comments of Motorola at v.

⁸² Comments of Motorola at 24.

⁸³ Comments of APCO at 15.

⁸⁴ Comments of NABER at 20.

The 26 years provides two cycles as follows: 16 years to convert from 25 kHz analog to 12.5 kHz digital systems (that is, APCO-25 type equipment) plus 10 years to convert from 12.5 to 6.25 kHz digital equipment.

- 37. The discussion regarding channelization has been dominated by concerns regarding time frames for introducing narrowband technology. 86 The comments generally discuss extended schedules, e.g., 26 years in the User Coalition plan. Most of these time frames conservatively favor full amortization of equipment, and assume unnecessarily long lead times for development and marketing of new narrowband technologies. We have decided to adopt a plan that provides a flexible framework within a much shorter period of time by which market-based incentives can be introduced into these private wireless bands. In contrast to many comments and the User Coalition plan, we have decided not to implement a comprehensive set of dates mandating strict manufacturing and licensing requirements. Rather, we conclude that the best approach is to specify type acceptance dates to guide the transition process. Recognizing that there is over \$25 billion in equipment investment in these PLMR bands, we will provide users immediate flexibility in equipment decisions and provide a period for the development of new technologies. This transition plan provides users the option of continuing to use existing equipment, transitioning immediately to more efficient narrowband equipment, or waiting until a full line of affordable narrowband equipment is available and costs become competitive, before changing out their systems. Thus, this plan allows each licensee the freedom to choose equipment and a transition schedule that best fulfills their needs while balancing technical capabilities and financial considerations. Since the rules we are adopting provide a great deal of flexibility to each individual licensee by being permissive rather than restrictive, requiring both rural and urban users to comply with them will not create an unreasonable burden.
- 38. The transition dates for the type acceptance rules we are adopting are as follows:87
- August 1, 1996 New type accepted equipment must be designed to operate on channels of 12.5 kHz or less or on 25 kHz channels if the narrowband efficiency standard is met (multi-mode equipment that operates on 25 kHz channels will be allowed if it is also capable of operating on 12.5 kHz and/or narrower channels).
- January 1, 2005 New type accepted equipment must be designed to operate on channels of 6.25 kHz or less or on channels up to 25 kHz if the narrowband efficiency standard is met (multi-mode equipment that operates on 25 kHz and/or 12.5 kHz channels will be allowed if it is also capable of operating on 6.25 kHz or narrower channels).

⁸⁶ A diagram of migration options that users may employ during the transition period is provided in Appendix A, Figure 6.

⁸⁷ Different provisions apply for paging, "color dot," and itinerant channels (see discussion later in document).

- 39. Our plan requires manufacturers to begin providing narrowband equipment over the next ten years. This ten year transition schedule is supported by the PLMR community. 88 Ten years affords PLMR users and manufacturers sufficient time to develop technical standards for narrowband radios and to design and test such radios. It is essential to allow sufficient time for the establishment of these standards in order to ensure that users will have the option of purchasing interoperable radios from multiple vendors. Further, this time period will provide ample time for different modulation techniques to be studied for compatibility and interference effects. Finally, since 5 kHz systems are currently allowed in the 150-170 MHz band 5 kHz systems are proliferating in the 220-222 MHz band, we believe that it is reasonable to expect manufacturers to produce 6.25 kHz equipment in the refarming bands within ten years. 90
- 40. The Commission's type acceptance rules provide some flexibility by which manufacturers can continue to support their existing equipment through upgrades and modifications. Wideband equipment can continue to be produced, but these radios must include a multi-mode feature. We believe that as systems wear out, and new radios are bought, users, will have a natural inducement, without a Government mandate, to use the narrower bandwidth of the multi-mode radios in order to avoid excessive adjacent channel interference. This will allow a natural transition to more efficient systems as new equipment is bought within each users normal replacement cycle. We also believe that a natural inducement exists for all users, especially those located in congested areas, to migrate to narrowband equipment as it becomes available. The use of narrowband technology will ease congestion because more channels may be used in a common geographic area. Finally, this plan maintains flexibility to introduce additional market-based incentives into these bands. We discuss these incentives to encourage greater spectrum efficiency in more detail in the FNPRM.
 - 41. One additional aspect of our plan concerns licensing on some of the new

Letter from American Petroleum Institute, Association of American Railroads, Industrial Telecommunications Association, Inc., APCO-International, Inc., Utilities Telecommunications Council, and the International Association of Fire Chiefs, Inc. and International Municipal Signal Association to Chairman Reed E. Hundt, Federal Communications Commission dated June 5, 1995.

⁸⁹ 47 C.F.R. § 90.271 allows the use of narrowband operation on frequencies 2.5 kHz or 7.5 kHz removed from regularly assignable frequencies in the 150-170 MHz band.

⁹⁰ Letter from Ericsson to William F. Caton, Federal Communications Commission, dated April 27, 1995, and comments of Securicor at 4 and 5.

⁹¹ Equipment that is type accepted prior to each of the transition dates may continue to be manufactured and used indefinitely. For example, a 25 kHz radio that is allowed today can still be manufactured after August 1, 1996.